CLAIMS

What is claimed is:

1. A method, comprising:

illuminating a first portion of a colored region with first light from a gas discharge tube;

generating a first output using a diffuse reflection of the first light from the first portion;

illuminating a second portion of the colored region with second light from a first solid state lamp;

generating a second output using a diffuse reflection of the second light from the second portion;

illuminating a third portion of the colored region with third light from a second solid state lamp; and

generating a third output using a diffuse reflection of the third light from the third portion.

2. The method as recited in claim 1, wherein:

with the first light having a first spectrum, generating the first output includes filtering the diffuse reflection of the first light according to a first filter spectral response to generate a first filtered diffuse reflection of the first light and measuring an intensity of the first filtered diffuse reflection to form the first output;

with the second light having a second spectrum, generating the second output includes filtering the diffuse reflection of the second light according to a second filter spectral response to generate a second filtered diffuse reflection of the second light and measuring an intensity of the second filtered diffuse reflection to form the second output; and

with the third light having a third spectrum, generating the third output includes filtering the diffuse reflection of the third light according to a third filter spectral response to generate a third filtered diffuse reflection of the

third light and measuring an intensity of the third filtered diffuse reflection to form the third output.

3. The method as recited in claim 2, wherein:

the first filter spectral response approximates a first spectral response formed using a ratio of a Z tristimulus color matching function to a product of a first detector spectral response and the first spectrum, where the first detector generates the first output;

the second filter spectral response approximates a second spectral response formed using a ratio of a X tristimulus color matching function to a product of a second detector spectral response and the second spectrum, where the second detector generates the second output; and

the third filter spectral response approximates a third spectral response formed using a ratio of a Y tristimulus color matching function to a product of a third detector spectral response and the third spectrum, where the third detector generates the third output.

4. The method as recited in claim 3, wherein:

the first gas discharge tube includes a xenon lamp;

the first solid state lamp includes a first white light LED;

the second solid state lamp includes a second white light LED; and

the first portion includes the second portion and the third portion.

5. The method as recited in claim 3, further comprising:

generating a fourth output using a fourth filtered diffuse reflection of the first light from the first portion by filtering the diffuse reflection of the first light according to the second filter spectral response to generate the fourth filtered diffuse reflection of the first light and measuring an intensity of the fourth filtered diffuse reflection to form the fourth output; and

generating a fifth output using a fifth filtered diffuse reflection of the first light from the first portion by filtering the diffuse reflection of the first light

according to the third filter spectral response to generate the fifth filtered diffuse reflection of the first light and measuring an intensity of the fifth filtered diffuse reflection to form the fifth output.

6. The method as recited in claim 5, wherein:

the first gas discharge tube includes a xenon lamp;

the first solid state lamp includes a first white light LED; and

the second solid state lamp includes a second white light LED.

7. The method as recited in claim 5, further comprising:

illuminating a fourth portion of the colored region with fourth light from a third solid state lamp; and

generating a sixth output using a sixth filtered diffuse reflection of the fourth light from the fourth portion by filtering the diffuse reflection of the fourth light according to the first filter spectral response to generate the sixth filtered diffuse reflection of the fourth light and measuring an intensity of the sixth filtered diffuse reflection to form the sixth output.

8. The method as recited in claim 7, wherein:

the third solid state lamp includes a blue light LED.

9. The method as recited in claim 7, further comprising:

generating a seventh output using a seventh filtered diffuse reflection of the first light from the first portion by filtering the diffuse reflection of the first light according to a fourth filter spectral response to generate the seventh filtered diffuse reflection of the first light and measuring an intensity of the seventh filtered diffuse reflection to form the seventh output; and

generating an eighth output using an eighth filtered diffuse reflection of the first light from the first portion by filtering the diffuse reflection of the first light according to a fifth filter spectral response to generate the eighth filtered diffuse reflection of the first light and measuring an intensity of the

eighth filtered diffuse reflection to form the eighth output.

10. The method as recited in claim 9, wherein:

the fourth filter spectral response corresponds to that of a first bandpass filter having a center wavelength substantially equal to 627 nanometers;

the fifth filter spectral response corresponds to that of a second bandpass filter having a center wavelength substantially equal to 490 nanometers; and

the first portion includes the second portion, the third portion, and the fourth portion.

11. A color measurement device comprising:

a gas discharge tube to illuminate a first portion of a colored region with first light having a first spectrum;

a first detector having a first detector spectral response and positioned to receive a first filtered diffuse reflection of the first light to generate a first output;

a first filter having a first spectral response formed using a ratio of a Z tristimulus color matching function to a product of the first detector spectral response and the first spectrum and positioned to receive a first diffuse reflection of the first light to generate the first filtered diffuse reflection;

a first solid state lamp to illuminate a second portion of the colored region with second light having a second spectrum;

a second detector having a second detector spectral response and positioned to receive a second filtered diffuse reflection of the second light to generate a second output;

a second filter having a second spectral response formed using a ratio of a X tristimulus color matching function to a product of the second detector spectral response and the second spectrum and positioned to receive a second diffuse reflection of the second light to generate the second filtered diffuse

reflection;

a second solid state lamp to illuminate a third portion of the colored region with third light having a third spectrum;

a third detector having a third detector spectral response and positioned to receive a third filtered diffuse reflection of the third light to generate a third output; and

a third filter having a third spectral response formed using a ratio of a Y tristimulus color matching function to a product of the third detector spectral response and the third spectrum and positioned to receive a third diffuse reflection of the third light to generate the third filtered diffuse reflection.

12. The color measurement device as recited in claim 11, wherein:

the first gas discharge tube includes a xenon lamp;

the first solid state lamp includes a first white light LED;

the second solid state lamp includes a second white light LED; and

the first portion includes the second portion and the third portion.

13. The color measurement device as recited in claim 11, wherein:

the second detector includes a position to receive a fourth filtered diffuse reflection of the first light to generate a fourth output;

the second filter includes a position to receive the first diffuse reflection of the first light to generate the fourth filtered diffuse reflection;

the third detector includes a position to receive a fifth filtered diffuse reflection of the first light to generate a fifth output; and

the third filter includes a position to receive the first diffuse reflection of the first light to generate the fifth filtered diffuse reflection.

14. The color measurement device as recited in claim 13, further comprising:

a third solid state lamp to illuminate a fourth portion of the colored region with fourth light having a fourth spectrum, where the first detector

includes a position to receive a sixth filtered diffuse reflection of the fourth light to generate a sixth output and the first filter includes a position to receive a diffuse reflection of the fourth light to generate the sixth filtered diffuse reflection.

15. The color measurement device as recited in claim 14, wherein:

the third solid state lamp includes a blue light LED.

16. The color measurement device as recited in claim 14, further comprising:

a fourth detector positioned to receive a seventh filtered diffuse reflection of the first light to generate a seventh output;

a fourth filter including a fourth spectral response having a first bandpass shape and positioned to receive the first diffuse reflection of the first light to generate the seventh filtered diffuse reflection;

a fifth detector positioned to receive an eighth filtered diffuse reflection of the first light to generate an eighth output; and

a fifth filter including a fifth spectral response having a second bandpass shape and positioned to receive the first diffuse reflection of the first light to generate the eighth filtered diffuse reflection.

17. The color measurement device as recited in claim 16, wherein:

the first bandpass shape includes a center wavelength of 627 nanometers;

the second bandpass shape includes a center wavelength of 490 nanometers; and

the first portion includes the second portion, the third portion, and the fourth portion.

18. A colorimeter, comprising:

a xenon tube to illuminate a first portion of a colored region with first

light having a first spectrum;

a first detector positioned to receive a first filtered diffuse reflection of the first light to generate a first output and having a first detector spectral response;

a first filter having a first spectral response formed using a ratio of a Z tristimulus color matching function to a product of the first detector spectral response and the first spectrum and positioned to receive a first diffuse reflection of the first light to generate the first filtered diffuse reflection;

a first white light LED to illuminate a second portion of the colored region with second light having a second spectrum;

a second detector positioned to receive a second filtered diffuse reflection of the second light to generate a second output and having a second detector spectral response;

a second filter having a second spectral response formed using a ratio of a X tristimulus color matching function to a product of the second detector spectral response and the second spectrum and positioned to receive a second diffuse reflection of the second light to generate the second filtered diffuse reflection;

a second white light LED to illuminate a third portion of the colored region with third light having a third spectrum;

a third detector positioned to receive a third filtered diffuse reflection of the third light to generate a third output and having a third detector spectral response; and

a third filter having a third spectral response formed using a ratio of a Y tristimulus color matching function to a product of the third detector spectral response and the third spectrum and positioned to receive a third diffuse reflection of the third light to generate the third filtered diffuse reflection.

19. An imaging device, comprising:

an interface arranged to receive data from a computer;

an image forming mechanism configured to form an image on media

corresponding to image data;

a color measurement device including a gas discharge tube to illuminate a first portion of a colored region on the media with first light having a first spectrum, a first detector having a first detector spectral response and positioned to receive a first filtered diffuse reflection of the first light to generate a first output, a first filter having a first spectral response formed using a ratio of a Z tristimulus color matching function to a product of the first detector spectral response and the first spectrum and positioned to receive a first diffuse reflection of the first light to generate the first filtered diffuse reflection, a first solid state lamp to illuminate a second portion of the colored region with second light having a second spectrum, a second detector having a second detector spectral response and positioned to receive a second filtered diffuse reflection of the second light to generate a second output, a second filter having a second spectral response formed using a ratio of a X tristimulus color matching function to a product of the second detector spectral response and the second spectrum and positioned to receive a second diffuse reflection of the second light to generate the second filtered diffuse reflection, a second solid state lamp to illuminate a third portion of the colored region with third light having a third spectrum, a third detector having a third detector spectral response and positioned to receive a third filtered diffuse reflection of the third light to generate a third output, and a third filter having a third spectral response formed using a ratio of a Y tristimulus color matching function to a product of the third detector spectral response and the third spectrum and positioned to receive a third diffuse reflection of the third light to generate the third filtered diffuse reflection;

a processing device configured to determine XYZ tristimulus values using the first output, the second output, and the third output received from the color measurement device and configured to generate the image data using the data received from the interface; and

a memory to store the data and the image data.

20. A color measurement device comprising:

means for illuminating a first portion of a colored region with first light having a first spectrum corresponding to a xenon bulb;

first means for detecting having a first detecting spectral response and positioned to receive a first filtered diffuse reflection of the first light to generate a first output;

first means for filtering having a first spectral response formed using a ratio of a Z tristimulus color matching function to a product of the first detecting spectral response and the first spectrum and positioned to receive a first diffuse reflection of the first light to generate the first filtered diffuse reflection;

means for illuminating a second portion of the colored region with second light having a second spectrum corresponding to a white light LED;

second means for detecting having a second detecting spectral response and positioned to receive a second filtered diffuse reflection of the second light to generate a second output;

second means for filtering having a second spectral response formed using a ratio of a X tristimulus color matching function to a product of the second detecting spectral response and the second spectrum and positioned to receive a second diffuse reflection of the second light to generate the second filtered diffuse reflection;

means for illuminating a third portion of the colored region with third light having a third spectrum corresponding to a white light LED;

third means for detecting having a third detecting spectral response and positioned to receive a third filtered diffuse reflection of the third light to generate a third output; and

third means for filtering having a third spectral response formed using a ratio of a Y tristimulus color matching function to a product of the third detecting spectral response and the third spectrum and positioned to receive a third diffuse reflection of the third light to generate the third filtered diffuse reflection.